



Updated April 18, 2019

Q&A: Croda Ethylene Oxide Release Nov. 25

What happened at the Croda Atlas Point plant?

At 4:15 p.m., Sunday, Nov. 25, 2018, ethylene oxide (EO) was accidentally released into the air from Croda's ethylene oxide plant. Since EO is very soluble in water, Croda deployed its water deluge system to contain as much of the release as possible. Croda personnel also began transferring the EO from the leaking vessel in the processing equipment to a secure containment vessel. Local responders and DNREC Emergency Response arrived. Water suppression continued. With input from Croda personnel, responders determined that by opening two nitrogen valves in the processing equipment, the remaining EO from the leaking vessel could be transferred to the non-leaking vessel, stopping the release.

Who and what was the response to the incident?

DNREC's Emergency Prevention and Response Section, the Delaware Fire School, and numerous New Castle County volunteer fire companies under the command of the Holloway Terrace Fire Company were the responders; working with Croda personnel, the release was contained by approximately 11 p.m. the same day it occurred.

What caused the leak?

Investigations by Croda, Inc. determined that the release was caused by a failed flange gasket on the water reboiler ("E-430") piping servicing the purification column ("T-430"). The gasket used was of a material not suitable for the operation. The investigation of the release by the Department of Natural Resources and Environmental Control (DNREC) confirms these findings.

Why was the Delaware Memorial Bridge closed? Who made the decision to do so?

The Delaware Memorial Bridge was closed to traffic as a precautionary measure due to the potentially hazardous nature of ethylene oxide, which is flammable and toxic. The bridge was cleared to be reopened at approximately 11:05 p.m. after the release had been stopped. The decision was made by the Incident Commander.

Who in the surrounding communities received notification, by what means were they contacted, and how was the universe determined?

A call was sent out through the Delaware Emergency Notification System (DENS) to advise residents in the nearby area to shelter in place, under an abundance of caution. The Incident Commander directed the New Castle County 911 Center to send the call to areas designated by the Incident Command Team of Holloway Terrace Fire Company and DNREC. The New Castle County Office of Emergency Management sent the call to Swanwyck, Swanwyck Estates, Castle Hills, Buttonwood, and Collins Park communities. The system reported that 3,703 people were called and got through on 1,744 phone numbers, reaching 1,050 people. Individuals who had signed up their cell phone numbers for DENS were included in the universe.

Who made the decision to advise residents to shelter in place for some residents and what information was used to make that decision?

The Incident Commander, consulting with public safety officials onsite, made the determination based on the conditions on the ground at the time.

Was anyone injured due to the release?

No injuries to plant personnel, responders or nearby residents have been reported. Five plant personnel sought medical observation in the week after leaving the facility. Four of the five were evaluated and released immediately, while a fifth person was held for 72 hours of observation as a precautionary measure.

What possible risks does ethylene oxide pose to human health? Should nearby residents be concerned?

According to the Delaware Department of Health and Social Services (DHSS): The reported level of the chemical from onsite monitoring is below levels that could be applied to characterize risk of health effects. Further, the compound is one that would be expected to disperse and break down relatively quickly once released into the atmosphere. Any risk to the public would have decreased significantly, if not completely, shortly after the end of the release – this is not a scenario that we would expect any lingering or long-term effects.

Are there any environmental impacts as a result of the deluge water used to contain the EO release?

DNREC has concluded that there was no increased risk to human health or safety from deluge water used to contain the Nov. 25, 2018 ethylene oxide (EO) release at Croda's Atlas Point facility. DNREC's conclusion was made from a soil and groundwater sampling report required of Croda by the Department as part of a settlement agreement with DNREC in the aftermath of the EO incident. The full report, prepared by an environmental consultant on Croda's behalf and reviewed by DNREC's Site Investigation & Restoration Section, can be found on the DNREC website (www.dnrec.delaware.gov/dwhs/SIRB/Documents/Croda-Arcadis-soil-and-groundwater-sampling-report-to-DNREC-04-08-2019.pdf). Terms of the settlement agreement required soil and groundwater sampling by Croda to determine if EO-contaminated deluge water had impacted the area west of Croda's EO production unit. EO was not detected in any of the soil or groundwater samples from Croda, according to the report. Another compound associated with Croda's operations, 1,4-dioxane, considered a contaminant, was detected in two soil samples, as well as the groundwater sample from the company. For the site's intended manufacturing use, the reported concentrations of 1,4-dioxane in the groundwater samples do not pose an unacceptable risk to health and safety. The reported concentrations of 1,4-dioxane, the locations of detections noted during sampling, and past detections of 1,4-dioxane by DNREC at the site led DNREC to conclude that there is a very low probability that last year's EO release was the source of the 1,4-dioxane concentrations sampled. Based on the levels and location, no further action is required to address this portion of the site. A DNREC letter to Croda reiterated that the Nov. 25, 2018 EO release does not change remedial actions already required by

DNREC in addressing site contamination at the Atlas Point facility and that are ongoing as directed by the Department.

Is DNREC actively helping with clean up at the site?

DNREC is actively investigating any environmental impacts as a result of the release and will oversee any remediation determined to be necessary at the site. Investigation about impacts to the soil and groundwater is complete. See the Environmental Impacts question, above, for more information.

Is the plant currently in full operation?

Croda's EO Plant remains shut down. DNREC's Accidental Release Prevention Program (ARP) is requiring that all of the following be completed by Croda, Inc. prior to obtaining approval from DNREC to restart the EO plant.

1. Completion of the Incident Investigation Report for the Nov. 25, 2018, EO Plant Incident. Completed.
2. Completion of the focused Process Hazard Analysis of all EO release points.
3. Completion of Pre-Startup Safety Review.
4. Completion of fire water system hazard analysis.
5. Completion of the fire water system procedures.
6. Completion of employee training of the EO Plant Operating and Emergency Procedures.
7. Completion of fire department manifold connection to fire water system supply tank.

When will the investigation be completed?

DNREC has completed an initial investigation into the cause of the release. See the Environmental Impacts question, above, for more information.

How much ethylene oxide was released?

Croda has estimated that 2,688 lbs. of ethylene oxide was lost in the release. The investigation of the release by DNREC confirms these estimates.

Were stored chemicals involved?

No, the release involved ethylene oxide that was inside processing equipment.

Does DNREC have any say over what chemicals are kept onsite?

DNREC does not regulate the chemicals themselves. For set amounts (called "threshold" amounts) of extremely hazardous substances, we review processing equipment to ensure it is in proper working order, including alarms and back-up systems. We also inspect storage areas, review response plans, and review training records of staff who are responsible for handling the chemicals on-site.

What other agencies are involved or are expected to be involved in the investigation?

Besides DNREC, OSHA is reviewing the incident.

What is ethylene oxide's use?

Ethylene oxide is used to make surfactants – short for surface-acting agents – which are used by other manufacturers to make a variety of consumer products, as well as processed into ethylene glycol, an ingredient in plastic polymers and antifreeze.

When was the most recent inspection of the Croda facility's EO equipment?

Croda's ethylene oxide plant was inspected on Oct. 22, 2018, by DNREC Division of Air Quality permitting staff as part of the process to transition from the construction permit to an operating permit that will be administratively amended into Croda's Title V air permit.

Could the incident have been prevented? Was or is there an approved suppression system in place that should have stopped the release?

Based on the results of the investigation, the use of an improper flange gasket in the construction of the EO Plant was the cause of the release on Nov. 25, 2018. Throughout the incident, a water deluge system was used to minimize the ambient air concentration of ethylene oxide and to minimize the risk of explosion or ignition of the released ethylene oxide.

What were the permit violations that were cited resulting from the Nov. 25, 2018 release?

The Department has determined that Croda, Inc. has violated 7 Del.C. Chapter 60, 7 DE. Admin. Code 1102 and Permit APC-2016/0068-Construction (Amendment 3) as follows:

1. Croda, Inc. violated 7 Del.C. §6003(a)(1) through the unpermitted release of ethylene oxide from a failed gasket at the EO Plant on Nov. 25, 2018.
2. Croda, Inc. violated 7 Del.C. §6003(b)(1) and Section 2.1 of 7 DE Admin. Code 1102 for operating the EO Plant from Oct. 6, 2018 to Oct. 22, 2018, prior to receiving an operating permit.
3. Croda, Inc. violated Condition 3.38 of Permit APC-206/0068-Construction (Amendment 3) by not maintaining and operating its facility in a manner consistent with good air pollution control practice for minimizing emissions, when it used the incorrect gasket that ultimately failed and resulted in the release of ethylene oxide emissions on Nov. 25, 2018.

The Department has determined that Croda, Inc. has violated 7 Del.C. Chapter 60, 7 DE. Admin. Code 7201 and Permit NPDES DE0000621 as follows:

1. Croda, Inc. violated 7 Del.C. §6003(a)(2) and sections 3.2.1 and 3.2.3 of 7 DE Admin. Code 7201, for the unpermitted release of deluge water, used to contain the release of ethylene oxide in the air that occurred from a failed gasket at the EO Plant on Nov. 25, 2018, to the ground.
2. Croda, Inc. violated Part II.A.2.b of Permit NPDES DE0000621 when the notification of non-compliance for the Nov. 25, 2018 ethylene oxide release at the EO Plant that was due Nov. 30, 2018 was not submitted to the Department until Dec. 5, 2018.

Will DNREC take enforcement action against Croda because of the release, and if so, what amount?

The settlement agreement between DNREC and Croda, Inc. includes a DNREC Secretary's Order issued on March 4, 2019, citing Croda for Division of Air Quality violations for the EO release and for the improper maintenance and operation of the Atlas Point facility. DNREC's Division of Water cited Croda for the unpermitted release of deluge water in violation of its NPDES (National Pollutant Discharge Elimination System) permit. Through the settlement, DNREC Secretary Shawn M. Garvin issued a Notice of Penalty Assessment and Order to Croda, Inc., for the violations of Delaware air quality regulations and the company's NPDES permit. The Secretary's Order assesses a penalty of \$246,739 to Croda, which includes \$16,489 for DNREC cost recovery from responding to and investigating the incident. The settlement, including the Order and penalty assessment, can be found on the DNREC website at dnrec.alpha.delaware.gov/secretarys-orders. Through the settlement agreement, the Department also reserves the right to take additional enforcement regarding these and other violations by Croda.

How can members of the public sign up for DEMA's Delaware Emergency Notification System (DENS) to receive notifications from local emergency response teams in the event of emergency situations or critical community alerts, such as evacuation notices, missing child reports, and boil water notices?

Members of the public can register for alerts from the DEN system at public.coderedweb.com/CNE/en-US/BF1D885328BF

How long has the Croda facility been in its current location?

The Atlas Point facility has been in its current location since 1937 (81 years). Croda purchased the facility in 2006. The Delaware Memorial Bridge was built in 1951.